

country, to have been decidedly above, the excess amounting to 9° for Tennessee and the Ohio valley, and diminishing as we proceed thence in all directions, it being 7.°7 for the upper Mississippi, 6.°9 for the lower Missouri, 6.°4 for the Gulf and South Atlantic States, 4.°9 for the Upper Lakes, 5.°4 for the Lower Lakes, 3.°8 for the Middle and Eastern States, 3° for the St. Lawrence valley, 1.°5 for Minnesota.

It should, however, be stated that, although above the average and among the warmest months, yet the past January was, except, perhaps in Kansas, by no means the warmest January of which we have records; thus January, 1828, appears to have been warmer in Tennessee and throughout the Atlantic and Gulf States. The January of 1843 was warmer from New Jersey to Maine, but colder in the southern stations; January, 1855, was warmer in the West and Southwest; January, 1853, was warmer on the Pacific coast.

Maximum Temperatures.—The maximum temperature at Pembina was 34°; at Mount Washington, 41°; at Key West, 83°. The maximum of 70° has been reported from stations on the line passing through the centre of Kansas, the southern border of Wisconsin, the lower Ohio valley, the southwest border of Kentucky, and thence north to Erie, Pennsylvania, thence east and then south between Maryland and Delaware to Cape Charles.

Minimum Temperatures.—The minimum temperatures have been for northern stations: —43° at Pembina, D. T.; —30° at Mount Washington; —25° at Breckenridge; —17° at Yankton, and for southern stations, 58° at Key West; 43° at Galveston; 39° at New Orleans. Minimum temperatures of 20° have been reported from stations on the line passing through central Texas and Arkansas, the southeast corner of Tennessee and central North Carolina.

Ranges of Temperatures.—The least ranges of temperature have been: San Francisco, 22°; Key West, 24°; Galveston, 32°. The greatest ranges have been: Pembina, 77°; Yankton, 76°; Mt. Washington, 71°; Malone, 69°; North Platte, 68°; Evanston, 66°; Boston, Fort Dodge and Colorado Springs, 65°.

PRECIPITATION.

Rainfall.—Chart No. III shows the general distribution of precipitation for the month. The regions of unusually large rain or snow are: lower Ohio valley, central Mississippi, lower Arkansas and Red rivers. Deficiencies are reported throughout the Atlantic States.

Rainy days.—From ten to twelve rainy days are reported from Tennessee, the Ohio valley and Lake region and New England. From three to ten rainy days in the South Atlantic and Gulf States.

Cloudy days.—From eight to twelve cloudy days are reported from the South Atlantic and Gulf States, and from twelve to sixteen over the Lake region.

RELATIVE HUMIDITY.

The mean relative humidity for the month averages as follows: Breckenridge 53; Cape May and Cheyenne, 58; Colorado Springs, 39; at Denver, 41; Dodge City, 56; Albany, 85; Alpena, 81; Marquette, 82; Mount Washington, 90; Pembina, 92; Peck's Beech, 82; Rochester, 81.

WINDS.

Wind directions.—The prevailing winds are shown by the arrows upon Chart No. II, from which it will be seen that these have been southwest in the South Atlantic and Middle States, northwest in New England and the Upper Lake region, southerly in the Gulf States, Ohio and Missouri valleys.

Total movements.—The sum total of the movements of the air, from all directions, have been: Sandy Hook, 13,160; Erie, 12,991; Grand Haven, 11,762; Long Branch,

11,251; Breckenridge, 10,153; Cheyenne, 10,017; Cleveland, 10,175; Lexington, 10,158; miles, and at Augusta, 2,600; Charleston, 1,936; Lynchburg, 3,140; Salt Lake City, 2,915.

Highest winds.—The maximum velocities exceeding 45 miles per hour were reported as follows: Boston, 45; Colorado Springs, 47; Davenport, 1st, southwest, 60; Denver, 46; Dodge City, 48; Duluth, 48; Erie, 9th to 11th, southwest, 56; Grand Haven, 48; Keokuk, 50; Long Branch, 6th, northwest, 58; Lexington, 48; Milwaukee, 48; Mount Washington, 132; New York, 9th, west, 48; Malone, 50; Evanston, 49; Omaha, 45; Port Huron, 58; Rochester, 48; St. Louis, 48; Sandy Hook, 9th, west, 60; Squan Beach, 9th, west, 60; Springfield, 45; Toledo, 9th, and 10th, west, 52; Washington, 45.

WATER TEMPERATURES.

The monthly maximum and minimum temperatures of water in river and harbors are given in a table on Chart No. II. A minimum of 31° or 33° has been reported at Buffalo, Chicago, Cleveland, Detroit, Duluth, Grand Haven, Keokuk, Leavenworth, Milwaukee, Pittsburgh, Portland, Me., Toledo and Wood's Hole. The maximum temperatures have been at Charleston, Galveston and Jacksonville 68, Mobile 63, Montgomery 62, St. Mark's 69, Shreveport 60.

NAVIGATION.

Depth of water in rivers.—A table on Chart No. III gives the highest and lowest readings of the river gauges during the month, from which it will be seen that at the end of the month the Red river was thirteen feet higher than at the beginning. The upper Mississippi fell during the first half of the month from three to five feet, and subsequently remained about stationary. The Ohio was lowest from the 9th to the 13th, and subsequently rose, especially in consequence of the warm weather and rains, from the 18th to the 25th, after which date the flood-wave passed down the river, giving maximum readings on the 29th at Cincinnati and Louisville, and then passing down the lower Mississippi, gave maximum readings slightly above the "danger line" at Cairo on the 31st, and Memphis and Vicksburg in February.

Ice in rivers and harbors.—The reports of ice in harbors and rivers are as follows: Buffalo, 20th, ice; January 21st, frozen up; 31st, but little ice remains. Detroit on the 11th, 12th, 13th, 22nd, 25th, 26th, 28th 30th, floating ice. Philadelphia, 13th, river frozen, 16th ice broken up. Albany, 2nd, river open. Davenport, 12th, 13th, 14th, 19th, 20, 21st, 22d, to 27th, 29th, 30th, 31st, floating ice. La Crosse, river frozen during the month, ice from one to two inches thick. Fort Niagara, N. Y., river nearly full of floating ice, 22nd and 26th. Madison Barracks, Sacketts Harbor, N. Y., bay full of drifting ice, 6th. Afton, Iowa, on 31st, pond ice, fourteen inches thick. Plattsmouth, Neb., on the 9th, ice cleared out of west channels, on the 11th, west channel closed, east channel partly clear; 18th, west channel clear, 22nd to 31st, heavy floating ice. Coopers-town, N. Y., Otsego Lake closed 13th, for the second time. North Hammond, N. Y., 21st, St. Lawrence frozen, 28th, river clear. Trenton, N. J., 14th, Delaware river closed, 19th, opened again. West Charlotte, Vt., 22nd and 24th, Lake Champlain partly closed, anchor ice in lake every day. Lunenburg, Vt., pond ice twenty inches thick. Bloomfield, Wis., 10th, Geneva Lake frozen over the second time and permanently. Middletown, Conn., Connecticut river opened 3rd and closed the 8th. Rockford, Ill., Rockford river frozen over 11th.

VERIFICATION OF "PROBABILITIES" AND CAUTIONARY SIGNALS.

(1) *Probabilities.*—A comparison of the published Probabilities with the weather following shows that the average percentage of verifications was, for January, for all the districts of the United States, 89.5 per cent.

(2) *Cautionary Signals.*—Of 132 Cautionary Signals that have been made during the month at the United States stations 113 were verified and 19 not verified by wind velocities of 25 miles at or near the stations; 71 cases are reported of brisk winds for which signals were not previously reported.